Bulk and interfacial thermodynamics of a symmetric, ternary
homopolymer-copolymer mixture: a Monte Carlo study

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We present results of a Monte Carlo simulation of a dense blend, comprising two incompatible
homopolymers and a symmetric diblock copolymer, all of the same degree of polymerization. The
simulations, in the framework of the bond fluctuation model, yield information on the phase dia-
gram. At high temperatures the copolymer dilutes the homopolymer blend and shifts the critical
temperatures of the unmixing transition to lower temperatures. The line of second order transitions
ends in a tricritical point, below which there is three-phase coexistence between two homopolymer-
rich phases and a spatially-structured copolymer-rich one. The simulations indicate that this latter
phase is a microemulsion at intermediate incompatibility, and a lamellar phase at high incompati-
bility. Using a multimagetic reweighting scheme, we determine independently the reduction of the
interfacial tension and the copolymer excess at the interface between the coexisting homopolymer-
rich phases. The bending rigidity is estimated by measuring the spectrum of interfacial fluctuations.
We outline a method to determine the interaction between copolymer monolayers, and find that in
the two-phase region, it is attractive and its range increases upon addition of copolymers.